

THE PULQUE OF MEXICO.

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Pulque is a fermented liquid made from the sap of the maguey, or agave, commonly known to English speaking people as the century plant. The production of the beverage is confined to Mexico and to those parts of that country where species of the agave suitable for making pulque are found.

Some years ago the writer, at the instance of Dr. G. Brown Goode, began a study of the beverages of mankind, and one paper, relating to kava drinking,^a has been published.

The study of pulque was prosecuted during an extended journey through Mexico in 1899 in company with Dr. J. N. Rose, who was engaged in the collection of botanical data of the agaves. This field work was supplemented by an examination of the specimens in the United States National Museum, collected by Dr. Edward Palmer, to whom the writer is much indebted for information concerning them.

The agaves flourish in the warm southwestern portions of the United States and range from the temperate to the tropical zone in Mexico. There are numerous species, distributed in diverse situations with regard to elevation, temperature, moisture, and soil. Originally, it appears, the cultivated agave was a desert form, inhabiting rocky, sterile places or dry sandy plains, as shown by the fleshy, thorn-armed leaves having chitinous epidermis which resists evaporation.

Botanically, the species are difficult of classification, this genus being easy of modification through change of environment and cultivation. It is perhaps impossible to determine accurately the original forms of the highly cultivated species, which may have differentiated as much as maize from its wild ancestor. It is likely that the ancestor of the pulque agave is represented by a wild form growing in the mountains of Mexico; but taking the cultivated agaves as a whole, they are derived from a number of species. Most of the agaves, both wild and cultivated, have many uses other than

^a Kava Drinking as Practiced by the Papuans and Polynesians. Smithsonian Miscellaneous Collections (Quarterly issue), XLVII, Aug. 6, 1904, pp. 85-92.

the preparation of a beverage. The agave is a wonder of the vegetable kingdom, ranking with the palm as a foster mother of tribes struggling upward with her help. When one recognizes the benefits the agave confers on man, there seems good ground for the generalization that without this plant the great population and the civilization of the high plateau of Mexico would have been impossible: for with the agave a civilization without cereals was feasible which was attended with economics of the highest value for promoting advancement. What wire is to modern civilization the fiber of the agave was to ancient Mexican culture. No country had a greater variety of material for cordage or textiles than was furnished to the Mexican tribes by the agave and related indigenous plants. With every step



FIG. 1.—REGION NEAR TUNOL, DURANGO, MEXICO; AGAVES IN FOREGROUND, PRICKLY PEAR IN MIDDLE GROUND.

in advance this plant became more useful, and in the stage of the cultivation of cereals to which the Mexicans had attained, the agave was, as it is now, indispensable to the well-being of Mexico. The benefits of the agave require too much time to enlarge upon in this place, however interesting, and must be hinted at by examples during the course of this paper.

While the agaves are, as a rule, scattered as solitary individuals or exist in groups of individual plants among other vegetation, there are in some localities vast natural fields, self-planted and self-perpetuating. Such fields may be observed around San Luis Potosi and in Durango, where the Agave, *Opuntia*, *Echinocacti*, and *Mamillaria* form a remarkable characteristic vegetation. There, primitive fields,

especially where they lie contiguous to markets, are now utilized to some extent for pulque, fiber, fruit, and confections of the tuna or prickly pear, etc., and are very profitable. In these natural fields began the utilization of the agave, their abundance rendering them of great economic value; but the products of the wild plants are inferior to those of the cultivated. The selection and cultivation of the economic variety appears to have begun with the agave grown for family use around the native jacals, where conditions of fertilization and care led to the development of large, thrifty, quick-maturing specimens, and this is the history of the adoption of valuable vegetal forms by man. Many of the native pueblos of Mexico still present this early

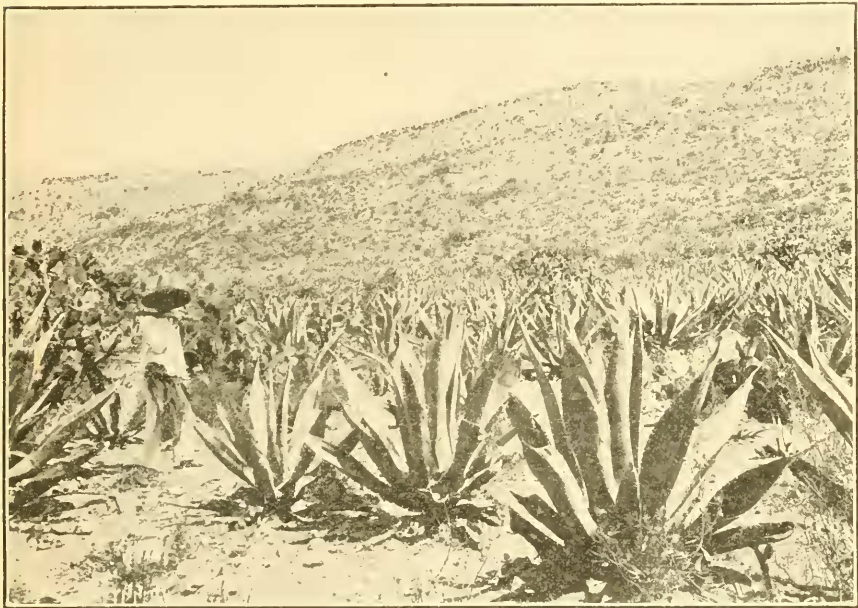


FIG. 2.—NATURAL GROWTH OF AGAVE, PRICKLY PEAR, AND CACTI ON HILLS NEAR TUNOL, DURANGO, MEXICO. WORKMAN WITH LEVER ON SHOULDER.

stage of plant domestication. They consist of numerous contiguous house plots, bounded by hedges of useful plants or loosely laid up stone walls, and in these gardens plants were tested and modified, and here were the early steps in agriculture. Within the first generation after Cortez conquered Mexico the Spaniards sought the commercial exploitation of the country, and the large grants of land made for various services to the crown were put to a wider use under a more compact organization of labor and transportation than had ever been accomplished by the native tribes.^a (Figs. 1-2.)

^a The Humboldt Codex has a representation of the pulque industry under Spanish management. Seler in Bull. 28, Bur. Amer. Ethnol., 1904, p. 210.

To European business methods we must attribute the vast tracts of cultivated agave, whose strange appearance excites the wonder of travelers. One sees on every hand prosperous haciendas devoted to the production of pulque. (See fig. 3.)

The haciendas in the pulque districts are indeed models of careful agricultural methods. The enormous and sure returns from pulque manufacture and the abundance and cheapness of the resident labor are apparent in the great and expensive buildings of the hacienda. For laborers there are a church, a school, a store, and a village of barracks; for the owner, an elaborate villa; and for the industry, a great tinacal, or vat house and various stables, grain houses, and storehouses, together forming an imposing group of buildings located among the fields of agave.

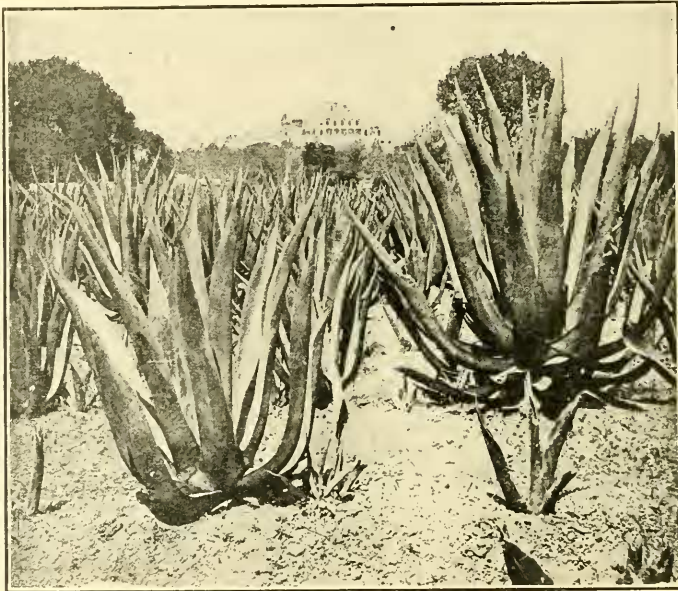


FIG. 3.—AGAVE PLANTATION NEAR CITY OF MEXICO; CHAPULTEPEC IN THE DISTANCE.

There is not space here to enter upon a detailed description of agave culture. In general, plants two years old are taken from the "seed beds" (as the close set plantations of suckers are called) and set out 8 or 10 feet apart, and for several years the spaces between the rows are sown with other crops. At times irrigation is required, but there is division of opinion as to its effect on the quality of the pulque. In about seven years the more forward plants, sometimes attaining a weight of 2 tons, are ready to bloom, and there are certain signs by which those who are skilled may detect the approach of this period. The size and age of the individuals, the brown spots which appear on the basal leaves, and the erect and bristling central leaves are prime

indications—the maculation appearing a year or more before the plant is ready to bloom. The workman, having selected the maturing plants, performs upon them the operation of *capar*. He attacks the *chevaux-de-frise* of the great agave by cutting the outer leaves with a pointed knife or a machete, taking out long slices and bending them over and away. One leaf near the ground he truncates, leaving the stump for a step, and he clears off the spines where they are in the way. When the cone of close-folded

leaves in the center is unmasked, he drives in his knife at the base and strips off the new white leaves, portions of which he impales on the adjoining

terminal thorns to act as *bandera*, or indicators. The plant is now left for a year, when a cavity is scooped out in its heart for the collection of sap. Descriptions of this operation usually fail to mention the year of incubation following *capar*, and give the impression that the collection of sap is begun at once. (Fig. 4.)

The dexterity of the workmen in preparing the plants with the aid of a medium size knife is remarkable. In Durango a stout oak *palanca*, or lever (see fig. 2), 54 inches long, is used to pry away the leaves in order to get at the heart of the plant, and the machete (see fig. 5) is used to cut the leaves. The lever probably points to a period before the introduction of the iron machete (such an implement being necessary to manage the fully-armed plant). Generally, the old leaves standing against the prevailing wind are left untouched, to furnish a screen against the dust which might otherwise blow into the cavity when the sap collects. Two or three hours after the cavity has been prepared, it fills up with a clear sweet liquid having somewhat the taste of milk from a young coconut. This fluid is called

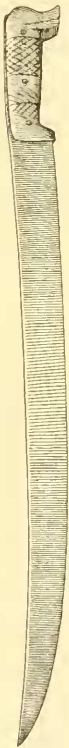


FIG. 5.—MACHETE.
HANDLE OF HORN
RIVETED TO IRON
BLADE.

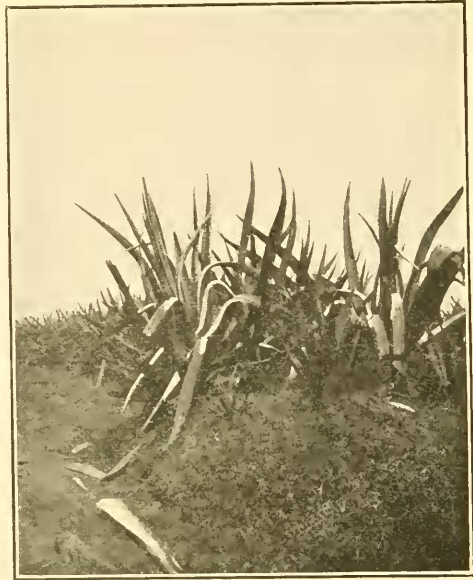


FIG. 4.—LARGE AGAVE PLANT PREPARED FOR INCUBATION. NEAR CITY OF MEXICO.

aguamiel. The sugar-secreting quality of the agave, greatest at the time of flowering, renders the sap at once available for fermentation.



FIG. 6.—HUGE AGAVE SHOWING BANDERA IMPALED ON POINT OF A LEAF. COLLECTOR AT WORK WITH SIPHON AND SKIN SACK.

The reason for the flow of sap is that the plant juices secreted in order to build up the large flower stalk (sometimes 25 feet in height

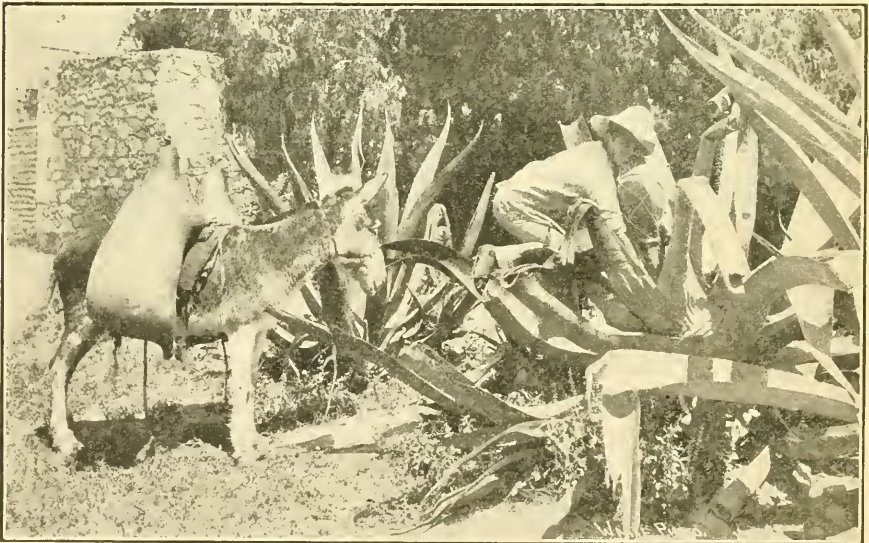


FIG. 7.—COLLECTOR OF AGUAMIEL AT WORK WITH SIPHON. IN THIS CASE TRANSPORTATION IS BY BURRO.

and 6 inches in diameter) are diverted into the cavity excavated in the heart. Wherever in Mexico the agave is grown for the produc-

tion of pulque, a curious apparatus is used in drawing the sap from the cavity, called "milking" the agave. It is a long, slender gourd, bulbous at one extremity, having the small end cut off and a small orifice at the summit of the bulb or in the side. It is placed, small end down, in the liquid, and the collector applying his lips to the orifice in the larger end and suddenly exhausting the air from the gourd, draws up the sap into it, closes the tube with his finger before the mouth is removed from the upper orifice, and turns the sap into a skin sack which he carries on his back. The gourd, which is called *ococote*, or *venencia* (meaning "siphon"), is mainly grown near Pachuca, whence it is distributed to the agave plantations. The "siphon" differs in various regions in Mexico. Generally the orifice is at the apex instead of on the side of the bulb. In Durango the tubular end is shod with horn, and sometimes "siphons"

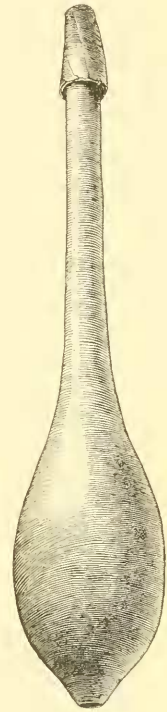


FIG. 8.—GOURD SIPHON SHOD WITH HORN. MUSQUITEC INDIANS.

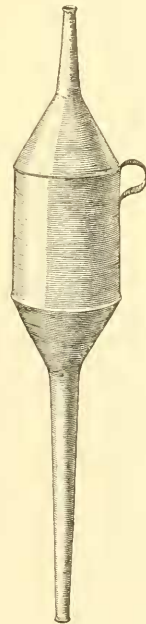


FIG. 9.—SIPHON MADE OF TIN. DURANGO, MEXICO.

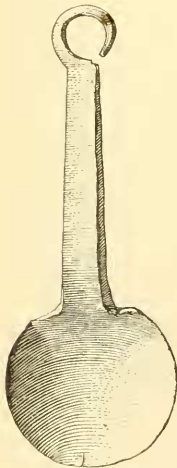


FIG. 10.—SCRAPER OF WROUGHT IRON. DURANGO, MEXICO.

made of tin are employed. After emptying the cavity, the gatherer takes an implement of iron called *raspador*, shaped somewhat like a spoon, but with a

deep bowl and sharp rim, and pares off a thin slice from the interior surface of the basin for the purpose of causing a renewal of the flow of the liquid. It is necessary to repeat this after each collection. (Figs. 6-10.)

The method of making the sack (fig.11) employed in transporting pulque is very interesting, as it illustrates an ancient industry and the preparation of a vessel still used in the East as well as in some European countries. A full-grown goat is killed; the head, feet, and tail are removed; the skin is loosened from the neck

with a knife, which is used only for this purpose. A wedge-shaped piece of horn about 4 inches long and 2 inches broad, with a sharp edge, is held in the fingers of the right hand and rapidly thrust between the flesh and the hide. When the legs are reached, they are separated

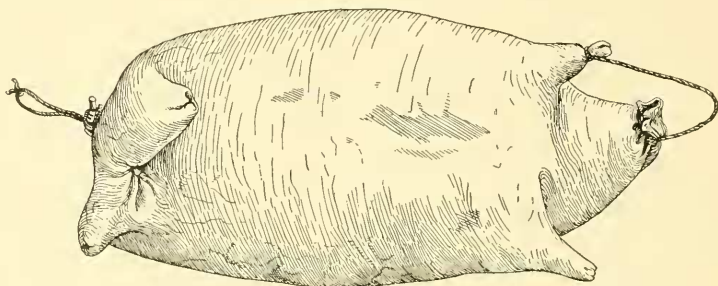


FIG. 11.—SKIN SACK FOR TRANSPORTING AGUAMIEL. IT IS USUALLY CARRIED IN A NET MADE OF AGAVE CORD. CHAUTLA, PUEBLA, MEXICO.

from the hide and pulled inside. In a short time the carcass can be drawn out at the neck, though sometimes one leg is cut off and the carcass drawn through that opening. Studs of willow wood are tied in

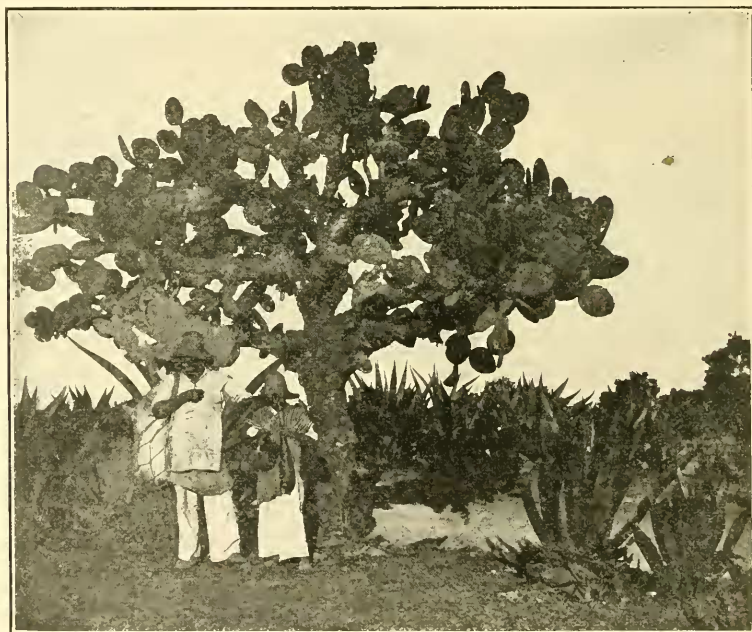


FIG. 12.—COLLECTORS OF AGUAMIEL. ZUMPANGO, MEXICO. SKIN SACK CARRIED IN A NET.

the orifice and the hide turned. A tube is now fastened in the neck and the skin is filled with air and by kneading is inflated to its utmost capacity. While in this state it is allowed to dry in the shade. These skin vessels are used for transporting other liquids besides pulque.

When the sack is full the collector transports it either on his own back or upon a burro to the brewery. (See figs. 7, 12 and 13.) Many haciendas, however, have lines of tramways running through the fields, over which the *aguamiel* may be brought in more expeditiously. The majority of owners of agave plantations have the sap gathered three times daily, at sunrise, noon, and sunset. The yield continues for three months, when the plant dies and becomes only useful as fuel. A large plant will yield 45 gallons of sap during the season. Humboldt says: "A very vigorous plant occasionally yields the quantity of 454 cubic inches in a day for four or five months."^a This seems to be an overestimate. A single man may attend 300 plants three times



FIG. 13.—TRANSPORTATION OF AGUAMIEL IN JARS SLUNG ON THE BACK. TEPEACA, MEXICO.

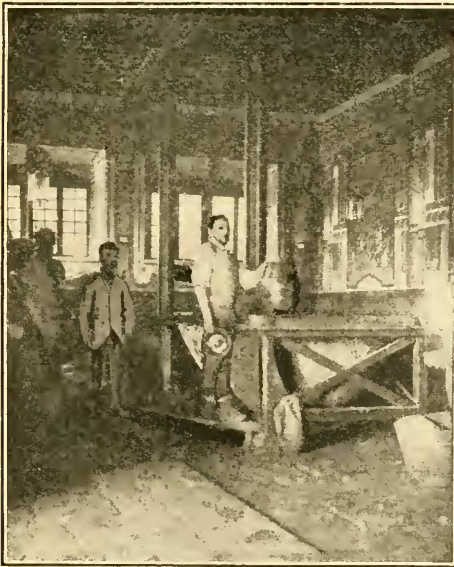


FIG. 14.—VAT HOUSE AND WORKMEN, HACIENDA DE SAN ANTONIO, OMETUSCO, MEXICO.

daily and receives 15 to 20 cents wages, with corn for his sustenance.

The chief building in which all of the interests of the hacienda center is the *tinacal* (*tina*, a vat; *hacal* Mexican, *calli*, a house). It is of one story, with numerous windows, and is usually of great extent filled with rows of shallow leather vats formed by stretching the hide of a bullock over a square frame supported on four short posts. Formerly, small owners laced a bullock's skin by its edges to four stout poles forming a frame. These were set up under a shelter in or near

the fields. A sieve made of horsehair is used to remove insects and litter from the *aguamiel*. (See figs. 14-16).

^aTravels. Edinburgh, p. 330.

Perhaps the most important spot in the pulque hacienda is the cool and clean darkened room where the *semilla* is kept. *Semilla* is the

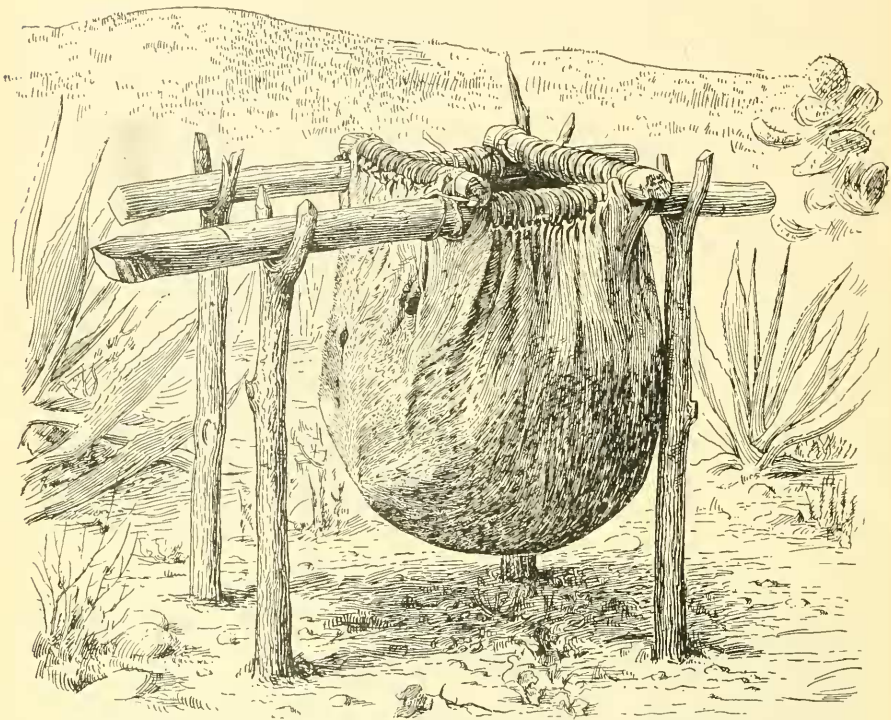


FIG. 15.—FIELD VAT FOR PREPARATION OF PULQUE. THE PULQUE IS DRAWN OFF BY MEANS OF HOLES IN THE SKIN.

yeast for fermenting the *aguamiel*, prepared by “setting” in a vat *aguamiel* to which has been added a pure culture of the ferment. This slowly ripens and is prevented from souring by the addition from time to time of fresh *aguamiel*. Portions of the *semilla* are added to the vats of *aguamiel* in the *tinacal*, or vat room, to produce strong steady fermentation. *Semilla* is thick and white and is made up of glistening globules like small tapioca. It is true that the yeast germs remaining in the pores of the hide vats and in the air of the *tinacal* will suffice to ferment fresh *aguamiel*

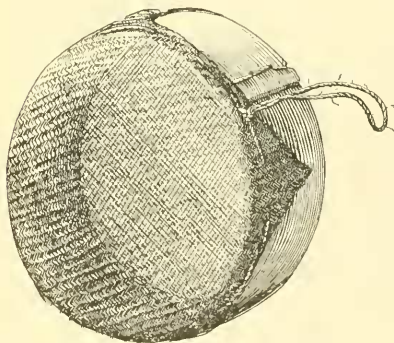


FIG. 16.—SIEVE FOR STRAINING AGUAMIEL. DURANGO, MEXICO.

poured into the vat, but in practice the process is too slow and uncertain. The fermentation is regulated and watched with great care

and corrected by the addition of fresh *aguamiel* when required. In a few hours the fermentation has gone through its various stages to the finished product, ready for the market, consisting of a turbid whitish liquid smelling like very old sour milk. It is barreled and hurried to the points of consumption with the greatest dispatch, since the liquid is perishable and the supply must be received daily. Special trains on the railroads in the pulque region are run for the distribution of this beverage, and transportation by wagon, mule back, canal boats, bearers, etc., is thoroughly organized.

While the present pulque industry is pursued on practically the same lines as in ancient times, the apparatus has changed in some respects since the Conquest. In the aboriginal period skins of large animals for vats and collecting bags were lacking and the fermentation and collecting was in pottery vessels and large gourds, as the writer has observed among the Indians of San Luis Potosí. Iron also was lacking and the knife and rasp were supplied by flakes and chipped implements of obsidian, and the great leaves of the plant were pried away with a heavy pole having a sharpened end like a chisel. It is not known whether the "siphon" was anciently used—a gourd or pottery dipper may have served for that purpose. Since the industry was local and domestic, there may have been other modifications of apparatus and processes due to environment and custom as there is at present in isolated portions of Mexico.

The pulquerias, which exist in great numbers, open up another phase of the question, full of interest to the student of sociology. The pulquerias (fig. 17) are foul-smelling resorts decorated in barbaric art, with a patronage of the lowest order hanging about in various stages of stupefaction. Pulque is the drink of the masses, and there is connected with it in the minds of the people much folk-lore and custom, and among these may be found survivals of cult beliefs and practices.

Pulque is very perishable, and various methods for preserving it have been tried, such as freezing, compression, and bottling, but with no practical success. Adulteration is frequent, and in this connection the roots of *Acacia flicina*, sold in the markets under the name of *timbe* (Mexican: *opactli*) has caused no little discussion. In the *Leyes de Indias*, Mexico, 1794, there is an old law (lib. VI, Tit. I; Ley 37; f. 192) prohibiting the adulteration of pulque, and it is there stated, "they mix with it certain roots, boiling water and lime, which gives it such force that it takes away the senses." A long list of the deleterious effects of the beverage follows, but *timbe* is not specifically mentioned. Bundles of the root are figured on plate 73, of the *Book of Life of the Ancient Mexicans*, edited by Mrs. Zelia Nuttall, and published by the University of California, in 1903. *Timbe* or *ocpatli* is described as "Raiz con que gozian el vino que se llama ocpatli." The late Dr. José Ramírez was of the opinion that the tannic acid of

the *timbe* is an efficient aid in stopping fermentation and that that is the cause of its use. There is no question, however, that this root was anciently used, and the impression has been that its purpose was to supply a ferment and make the liquid stronger; but Doctor Ramirez has here advanced what seems to be a scientific and adequate explanation. Pulque is the basis of a number of compound drinks, and various means are employed to modify its flavor. Pulque prepared with special care for use of the haciendas is quite palatable com-



FIG. 17.—PULQUE SHOP NAMED FOR QUEEN XOCHITL. CUERNAVACA, MEXICO.

pared with the commercial product sold in the cities. It has a sub-acid taste like the juice of an apple, a heavy body, and a very slight alcoholic flavor. In this form it is an agreeable and apparently nourishing beverage. Taken in large quantities pulque is intoxicating, but the effect of habitual stimulation with it is not worse than that produced by lager beer. The repellent odor and taste of the liquor, however, take it out of the category of beverages which appeal to the higher gustatory sense and mark it as one solely drunk for its after

effect. When the agave sap is mixed with water and sugar and allowed to ferment, a more agreeable beverage called *tepache* results, which is sold in a characteristic way. (Fig. 18.)

To a certain extent, distillation has been practiced in connection with the pulque industry. Pulque distilled yields *mescal de pulque*, a spirit of little value and not to be compared with mescal like that of Tequila, which is distilled from the fermented saccharine product of the roasted agave. Largely because the distillation of pulque

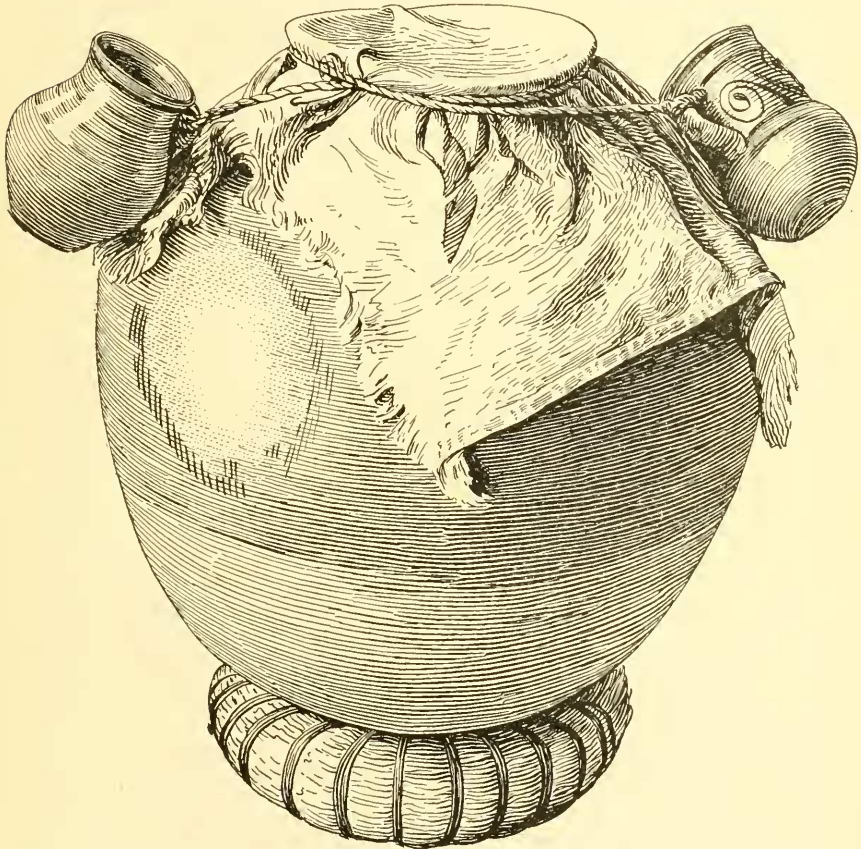


FIG. 18.—TEPACHE VENDOR'S OUTFIT CONSISTING OF AN OLLA, OLLA RING, AND TWO CUPS. DURANGO, MEXICO.

low in alcoholic content is not profitable, and because roasted agave and highly fermented fluids of different classes yielding better spirit are common, *mescal de pulque* is not often made. The fact, however, that pulque was distilled is interesting in connection with the distillation of palm wine. Like wines, pulque is distinguished by the regions in which it is produced, and the output of a certain hacienda often enjoys a reputation for flavor and quality. The pulque of Apan in Tlaxcala, on whose vast plain agave fields stretch away as far

as the eye can reach, is classed as *pulque fino*, and is the standard of excellence. That produced in the valley of Mexico, Toluca, and other parts, is known as *pulque coriente*, or *tlachique* in the Nahuatl tongue. The larger part of the pulque produced in Mexico is *tlachique*, which differs chiefly from the *pulque fino* in that it is sweet and has little flavor. At the hacienda de San Antonio de Ometusco, through the courtesy of the proprietor, the writer had every facility for studying the manufacture of the highest grade of pulque, and the description above is largely the result of observations made there, at least in so far as reference is made to the modern organized pulque industry.

Much has been said concerning the nourishing qualities of pulque. An analysis shows that, while *aguamiel* contains 12 per cent of nourishment, pulque contains only 2 per cent and about $3\frac{1}{2}$ per cent of alcohol, the remainder being water. A substance called *agavin*, which is supposed to have medicinal properties, has been isolated from pulque. An analysis of *aguamiel* and pulque shows:

Constituents.	Aguamiel.	Pulque.
Albuminoid substances, gum and resin.....	2.54	1.26
Sugar.....	9.55	.82
Salts.....	.73	.22
Alcohol.....	None.	3.68
Water, gas, and loss.....	87.18	94.02
	100.00	100.00

Tribes in the lowest known stages of culture are found to have at least a rudimentary understanding of the process of fermentation, which may have been occasionally used in the period when man lived upon the natural products of the earth. The juice of sweet fruits, either of fruit gathered and stored for a short time or prepared by cooking or pulping, might easily reveal the working of fermentation, which is one of the steps toward decay. An intimate acquaintance with the vegetable world was one of the first lessons of mankind and it brought to him many useful arts bearing the seeds of development for subsequent periods. In turn came the cultivation of root crops and grain crops, a knowledge of fermented beverages spread widely and, in course of time, though much later, this branch of domestic chemistry was completed by the invention of distillation. Side by side with these arts that sprung from agriculture were retained the earlier valuable arts growing from the economic uses of plants, as exemplified by pulque and palm wine.

The legend of the origin of pulque, according to Lobato, is as follows: About the year 1042, when Tepancaltzin became chief of the Toltecs—the eighth among those who held that office—there came to

visit him a prominent man named Papantzin, accompanied by his beautiful daughter Xochitl. The maiden presented to the chief a jar of pulque, of which he and his attendants drank and were pleased with the effects which followed. Xochitl told Tepancaltzin that the beverage was obtained from the maguey plant, from which a whitish and sweet juice was extracted and on fermentation became pulque. Tepancaltzin, intoxicated by the pulque prepared by Papantzin's daughter, and infatuated with her beauty, fell in love with her and married her. Thus Xochitl became queen of Tollan, and she bore Tepancaltzin a child who was called Meconetzin, "the son of the pulque," a name given him to commemorate the discovery and invention of the pulque made by his mother, Xochitl. It is said that Tepancaltzin and Xochitl were killed in a battle when the Toltecs were destroyed, and Meconetzin, the last chief, never came to his own.^a

Like most aboriginal legends, it may contain a kernel of truth and refer to some historical event, long subsequent, however, to the actual knowledge of the fermented sap of the agave, which was acquired at some stage of the utilization of the plant.

There was great scarcity of animal food on the plateau of Mexico, and to satisfy the craving for such food, fly larvæ from the lake, lizards and the like, were eaten. Especially prized and sought were the larvæ of an insect which bores the fleshy leaves of the agave, a fat white grub about 1 inch long whose scientific name is *Accentrocneme kollari* Felder, called by the Mexicans *guson*, and in Nahuatl *mescuillin*. It is figured in the Troano manuscript^b (fig. 19), and its characteristic is seen to be the gnawing apparatus by which it tunnels the agave. Gusones to this day are collected in April, boiled, wrapped in the epidermis of the agave, sold on the streets of Mexico and are eaten with avidity. To all appearances they are nourishing and palatable, and it is said that connoisseurs prefer them to oysters or swallows' nests.

The writer believes that the discovery of the sap-yielding quality of the agave was through search for these larvæ.

The search for fiber also no doubt brought about an early acquaintance with the agave, which may have led to the knowledge of its stores of sap. The finest whitish fiber is found in the young unsheathed leaves of the central spike, and the removal of these previous to the flowering under certain conditions might have taught the important lesson.



FIG. 19.—GUSONO GNAWING THE AGAVE. MEXICAN PICTURE WRITING.

^a Extracted from *Estudio Químico Industrial de los Varios Productos del Maguey Mexicano*. Jose G. Lobato, Mexico, Government, 1884.

^b Cyrus Thomas, *Maya Codices*, 6th Ann. Rep. Bur. Amer. Ethnol., p. 351.

Another conjecture is that the Mexican tribes were instructed in the method of tapping the agave by some one who was familiar with the art of tapping the palm, which has been practiced in the Orient from time immemorial. This seems going rather far afield for an explanation. If there is anything the Indian understands it is his plants, and in a multitude of ways he proves this familiarity and illustrates their nearness to him above all other things in nature. Still, since the tapping of the agave is a complicated operation not likely to have been arrived at in a haphazard manner, it is possible that the idea may have come from a foreign source.

It is interesting in this connection to mention that the beverages of the tribes of mankind include but two prepared by fermenting the sap obtained by tapping plants—pulque and palm wine—and that with them is connected primitive distillation.